



NTSB National Transportation Safety Board

Fatigue Management: Enhancing Safety and Performance

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Board Member

Leadership and Advice in Crisis
September 15, 2011

10 fatalities
3 serious injuries
2 minor injuries
5 no injuries

**Ford
Windstar**



**Hyundai
Sonata**

**Kia
Spectra**

Owatonna, MN/July 31, 2008



8 fatalities

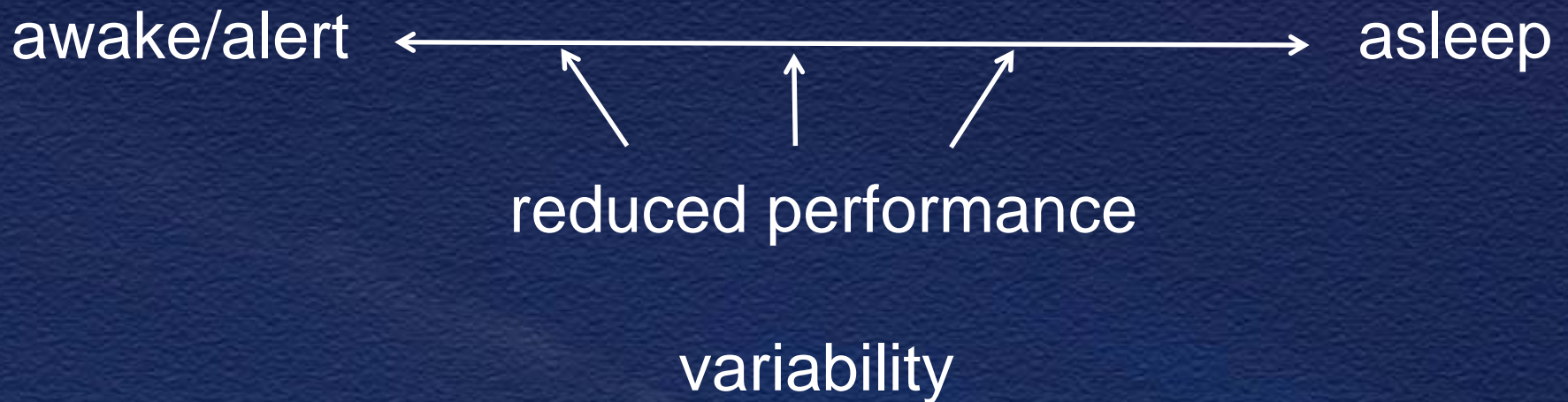
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Fatigue Risks

Fatigue can degrade
every aspect of
human capability.

Fatigue Risks



Fatigue Risks

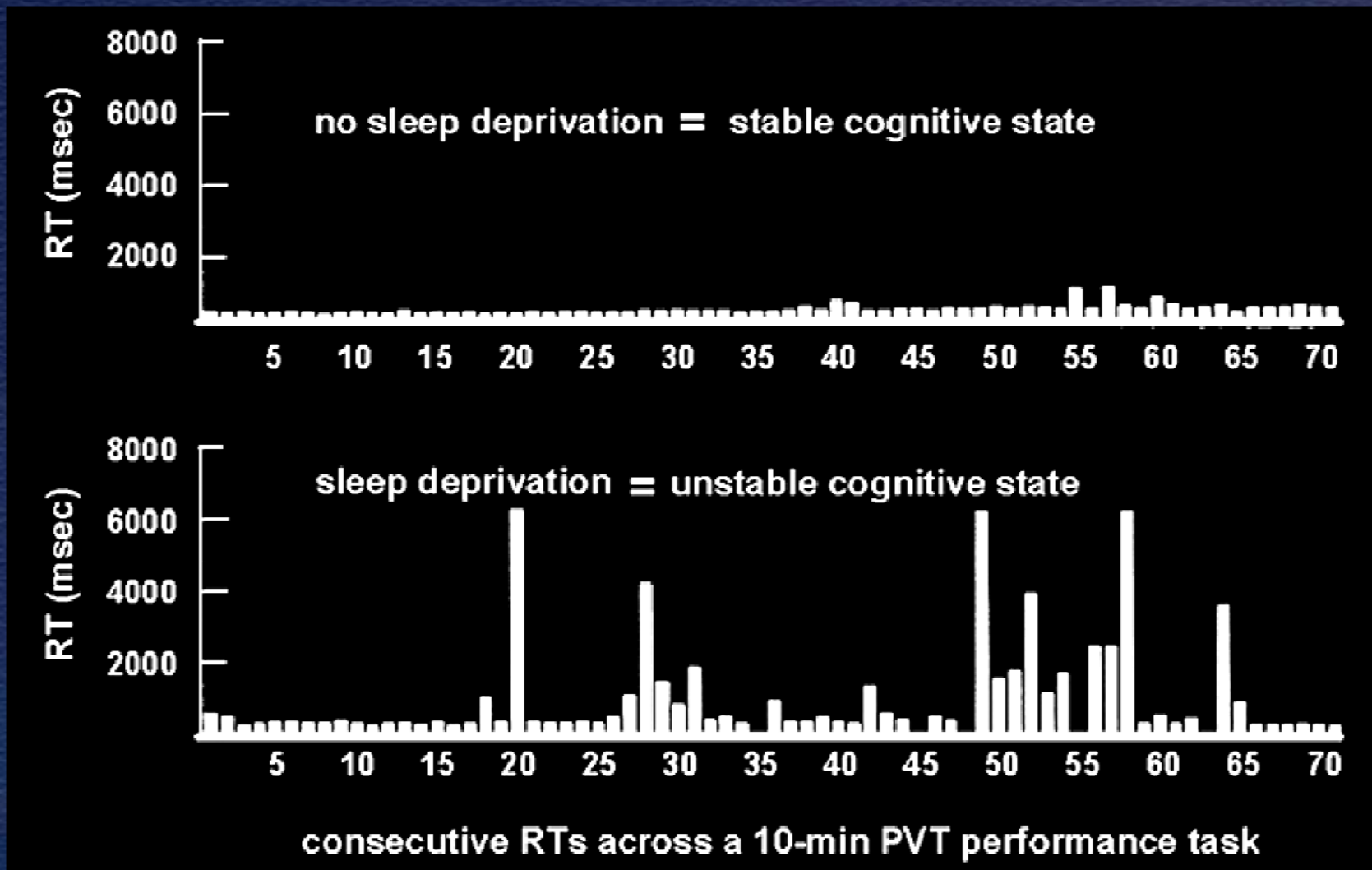
- degraded 20 – 50%+:

- reaction time
- judgment
- memory
- attention
- communication
- mood
- situational awareness

- increased:

- irritability
- attentional lapses
- apathy
- microsleeps

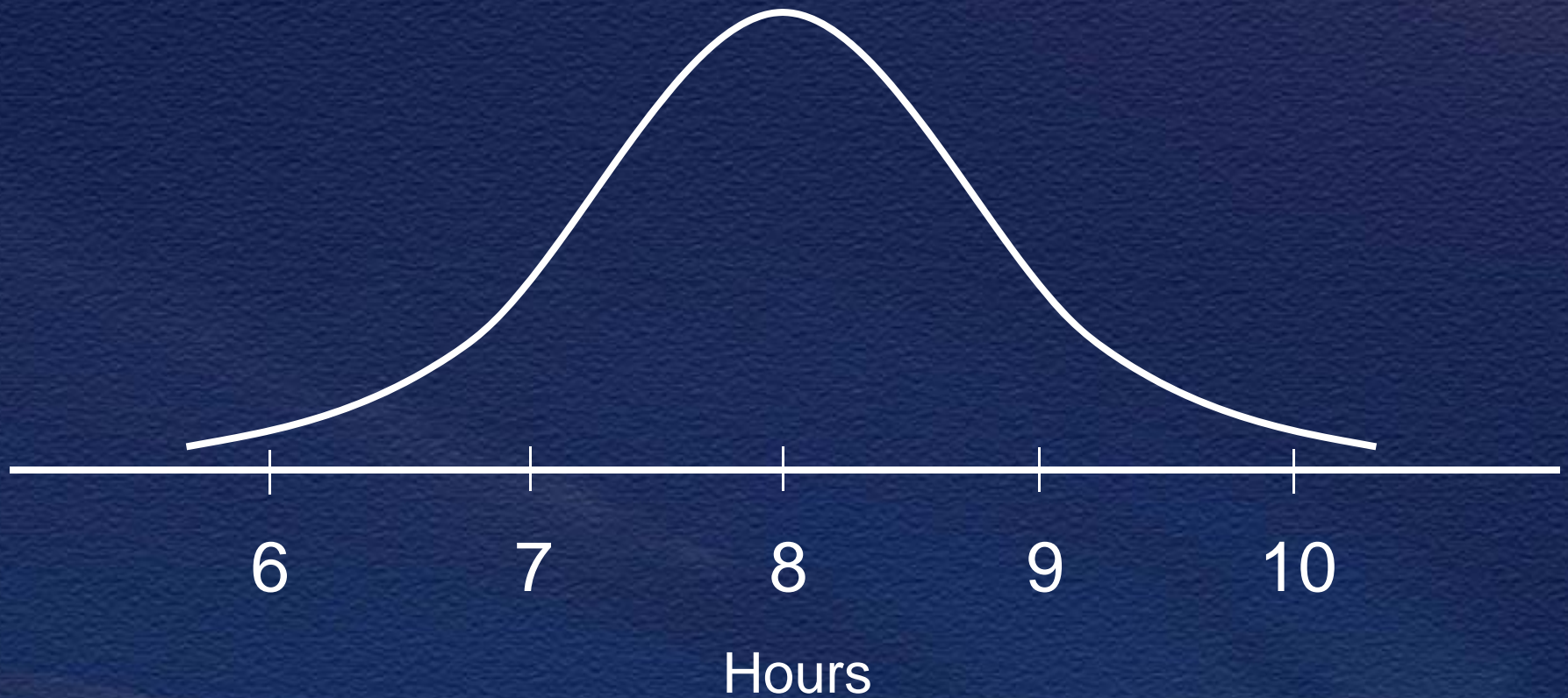
Fatigue and Reaction Times



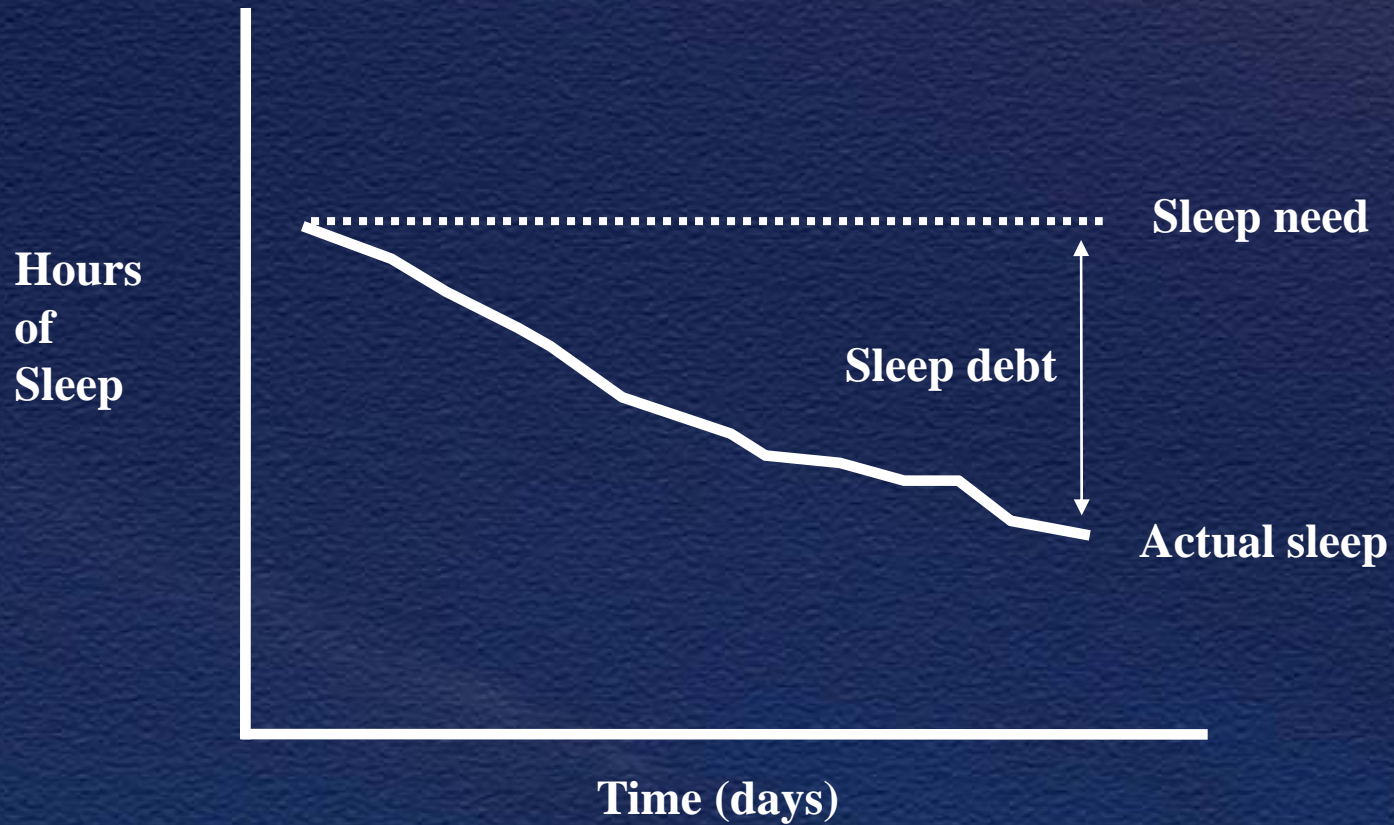
Doran SM, Van Dongen HP, Dinges DF. Sustained attention performance during sleep deprivation: evidence of state instability. *Archives of Italian Biology: Neuroscience* 2001;139:253-267.



Sleep Requirement



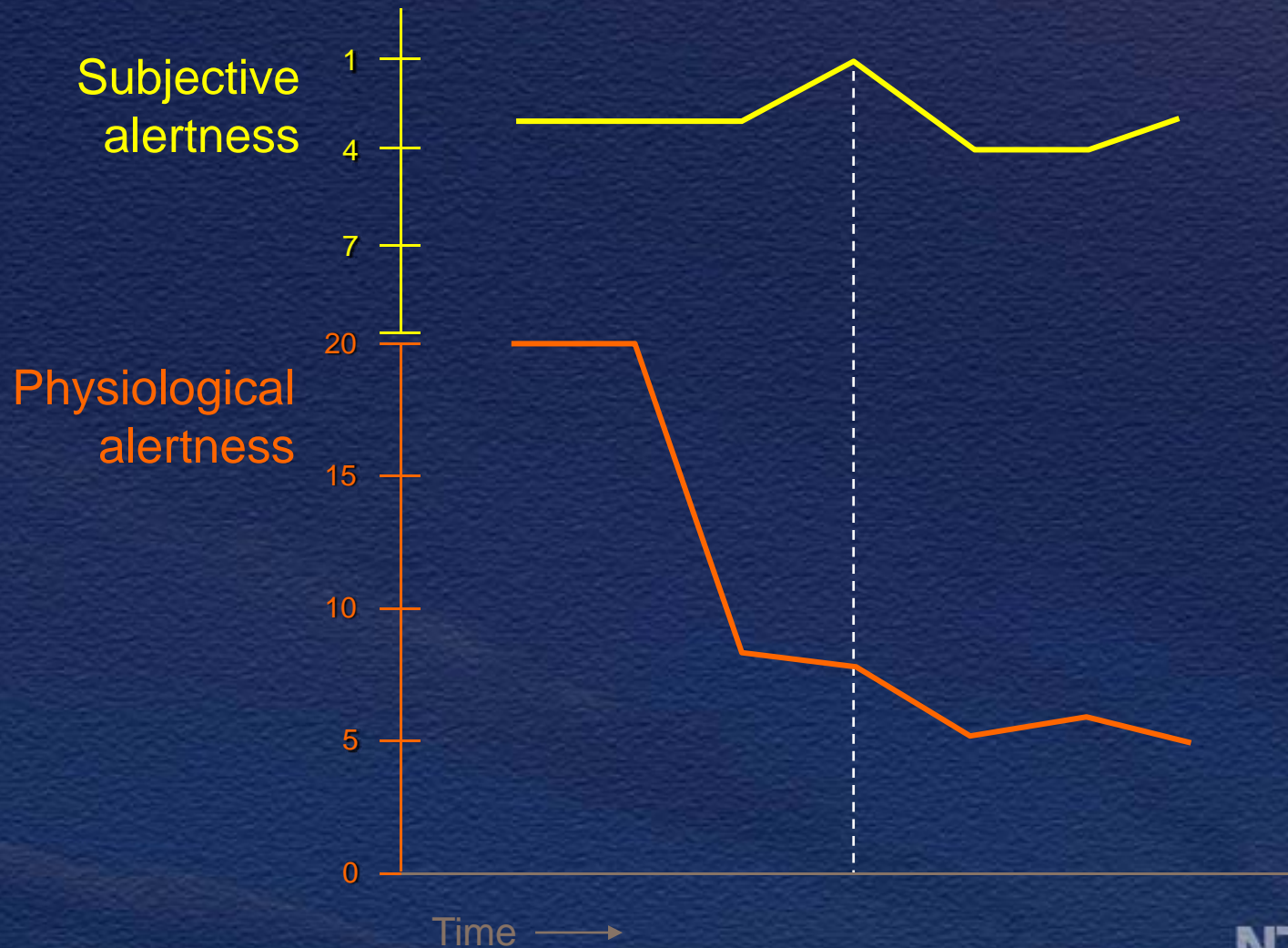
Cumulative Sleep Debt



Sleep Need – Actual Sleep = Sleep Debt

Sleep debt grows cumulatively over time

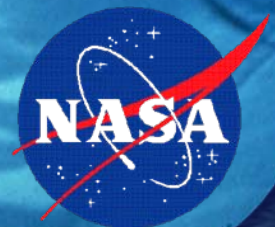
Alertness Reports Often Inaccurate



Adapted from Sasaki et al., 1986

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